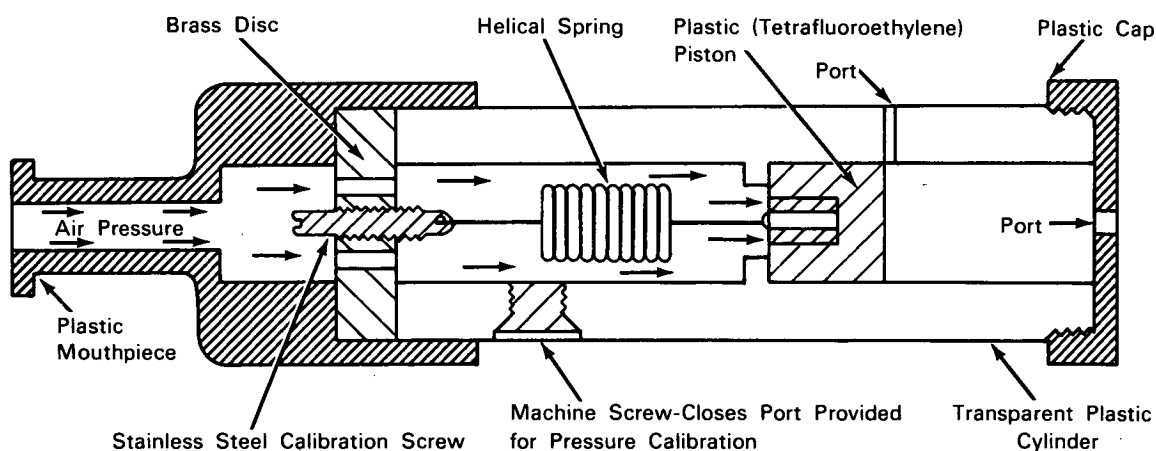


# NASA TECH BRIEF



This NASA Tech Brief is issued by the Technology Utilization Division to acquaint industry with the technical content of an innovation derived from the space program.

## Device Induces Lungs to Maintain Known Constant Pressure



**The problem:** To design a device that requires a human subject to use his thoracic muscles to maintain a prescribed air pressure in his lungs for periods of at least 15 seconds. Maintenance of a known constant pressure in the lungs is useful for evaluation of the orthostatic reflex of the cardiovascular system and also as a periodic exerciser of this reflex. Liquid-filled manometers which are used for these purposes have the disadvantage that the subject can maintain a prescribed air pressure with the cheek muscles alone without employing the thoracic muscles. In addition, these manometers are relatively large and fragile, and their liquid contents can be easily spilled.

**The solution:** A device consisting of a hollow cylinder of clear plastic fitted with a mouthpiece, a spring-loaded piston, and a small vent through which air escapes when the subject's lung exhalation into the mouthpiece displaces the piston by a desired amount.

**How it's done:** When the subject breathes into the mouthpiece, the exhaled-air pressure exerted against the spring-loaded piston causes it to move a distance proportional to the applied pressure. The device is calibrated for the required pressure, 40 millimeters of mercury for example, so that when the subject's exhaled air applies a slightly greater pressure, the piston moves past the vent in the side of the cylinder and the air flows out to the atmosphere. The size of the vent is chosen to prevent exhaustion of the air in the subject's lungs for up to 30 seconds of test and to force him to use his thoracic muscles rather than his cheek muscles to maintain the required pressure. An annular line on the piston coincides with a reference line on the clear-plastic cylinder when the piston moves just past the vent. The subject is instructed to maintain this alignment to avoid overpressure which would occur if the piston were allowed to move too far past the vent.

(continued overleaf)

**Notes:**

1. Compared to liquid-filled manometers, this device is smaller, more rugged and reliable, is much easier to use, and assures a more nearly constant pressure with less mental effort from the subject.
2. The device can be fabricated for various pressures and air flow rates by proper vent placement and cylinder bore size. By placing a number of vents along the cylinder wall, a sliding ring can be arranged to uncover only one vent for selection of the desired pressure.

3. For further information about this innovation inquiries may be directed to:

Technology Utilization Officer  
Manned Spacecraft Center  
P.O. Box 1537  
Houston, Texas, 77001  
Reference: B64-10108

**Patent status:** NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA Headquarters, Washington, D.C. 20546.

Source: M.W. Lippitt and J. H. Reed  
(MSC-50)